

# The Ontology Maturity Model<sup>1</sup>

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Building on the notions of the Ontology Spectrum, we describe one possible view of how an enterprise may migrate from less expressive semantic models to more expressive models, i.e., to real ontologies, based on both the common understanding of the enterprise and its requirements for more complex applications. Figure 1 displays an overall Ontology Maturity Model, simplified here, that shows the significant gradations toward greater maturity/capability an organization may take in its evolution toward more completely realizing the goal of an ontology-driven enterprise.

In this figure, which is patterned after the SEI's CMM which was intended to describe and gauge an organization's software process maturity [2] and the more recent CMMI, we begin to develop a scale of maturity in an organization's migration towards increasingly more robust approaches to the use of ontologies for information technology needs.

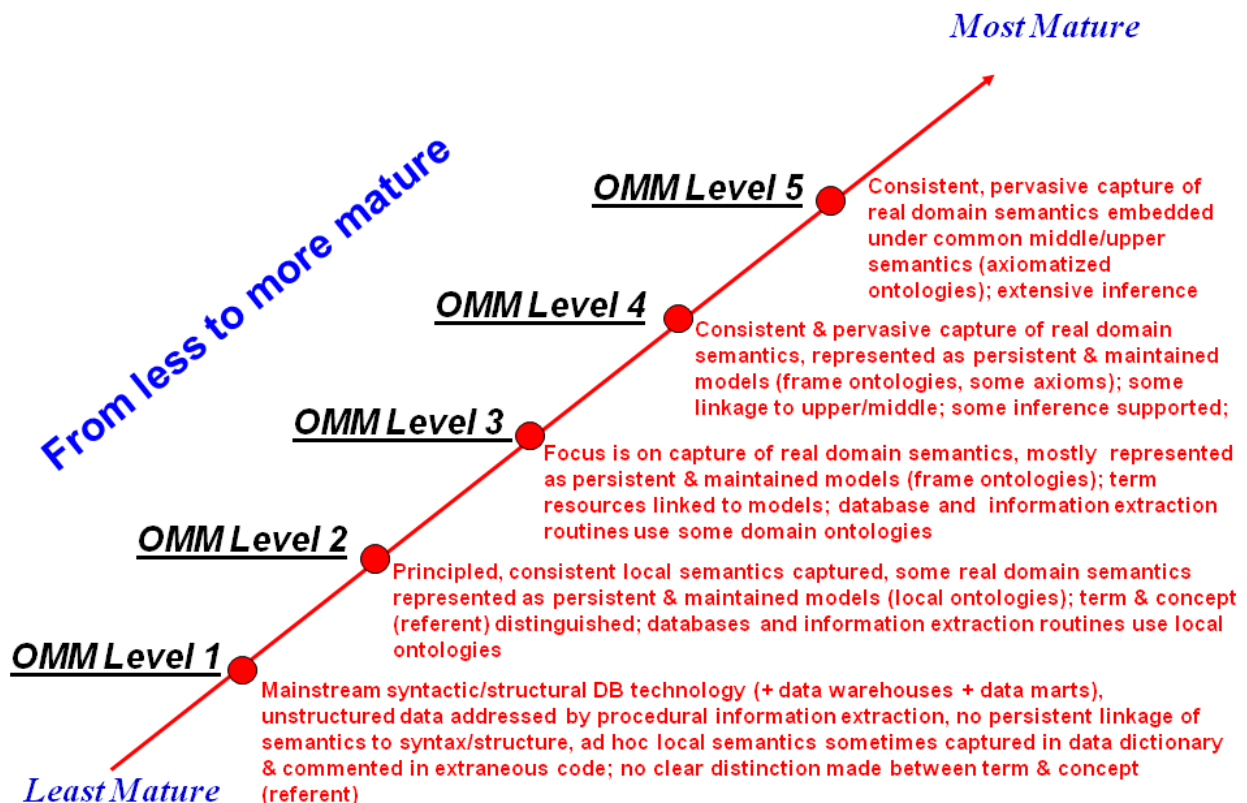


Figure 1: Ontology Maturity Model (OMM)

<sup>1</sup> Portions of this section were adapted from [1].

Our analysis is that initially an organization thinks primarily of local semantics, i.e., attempts to characterize their information technology needs based on (currently mainstream) syntactic and structural methods, with only implicit semantics: a nodding of the head to signify agreement with the semantics as uttered in speech, or an agreement on a data dictionary of English or other natural language definitions, which ostensibly humans can read and indirectly nod their heads over. However, as an organization evolves, it begins to understand that it is actually composed of many communities and sub-organizations, each of which has its own local semantics, and so perhaps develops “communities of interest” in which disparate groups come together to share information for specific purposes. But in addition, the evolving organization begins to understand that it also requires a common enterprise-wide semantics, in fact a common semantics based on real world referents that all communities and sub-organizations in the enterprise share. Most commonly, as a semantically aware enterprise matures, it eventually distinguishes between terms (ways of referring) and concepts/referents (referents or categories of referents which are referred to by potentially many different terms). Hence, the semantic models that the maturing enterprise embraces evolves from term-based models (weak taxonomies and thesauri, i.e., controlled vocabularies) to concept/referent-based models (weak and strong ontologies).

In addition, as the maturing enterprise begins to understand that controlled vocabularies are necessary but not sufficient, i.e., that of much more importance are the underlying concepts of those terminologies that get modeled as machine interpretable ontologies, the enterprise tries to fit together the local semantic models it currently has, i.e., the local database schemas, metadata schemes, or even local community ontologies. Because it is soon recognized that there is both great dissimilarity and great duplication of meaning among the diverse ontologies, the enterprise attempts to reconcile the semantics. It does so initially by trying to construct semantic mappings between any two given ontologies. Then when the problem repeats itself time and again with every additional ontology which needs to be mapped to, the enterprise begins to understand that the emerging mapping ontologies are actually integrative ontologies that must be as expressive as the most expressive of the ontologies needing to be integrated. Eventually recognition dawns on the enterprise that those integrative ontologies themselves need to be integrated into a wider spanning and more general integrative ontology. And so, the need for greater semantic interoperability requires semantic rationalization and the emergence or adoption of common upper and middle ontologies.

## References

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